OBSERVATIONS ON THE BASAL METABOLISM ESTIMATIONS IN THE GOITER CLINIC OF THE UNIVERSITY HOSPITAL.

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Studies in basal metabolism have been of the greatest scientific value and interest in experimental physiology and research medicine. Our knowledge of the physiology and of the diseases of the thyroid gland is based primarily upon such studies. Is there a practical working value as well in the estimation of the basal metabolic rate; and in what ways are such estimations of value to the surgeon in the diagnosis, prognosis and treatment of cases of hyperthyroidism?

We have found the portable Benedict apparatus of the greatest practical value in this clinic because of its small size and simplicity. In the hands of an experienced operator the readings compare favorably with those taken by the more costly and time-consuming instruments. It has been our practice to take readings on all goiter cases before and after treatment, whether that consist in ligation or thyroidectomy. Before the initial reading is made the patient is run through the various steps in the procedure on one or more days, depending on her nervous state, until we are confident she is no longer alarmed by the experience. If the case comes to ligation as the initial step in treatment a second reading is taken either before leaving the hospital or when the patient returns for thyroidectomy several months later. The final reading, after all treatment is over, is usually made within a year from the last operation, when the patient returns for final observation.

For the convenience of study and analysis we have divided our cases into four groups, based on the metabolic rate.

Group 1. Basal metabolic rate from 10 to 20 per cent.
Group 2. " " " " 20 to 40 "
Group 3. " " " " 40 to 60 "
Group 4. " " " " 60 and up.

As the same time we have graded our cases according to the symptomatic evidence of toxicity alone into four groups. This was done without a knowledge of the metabolic rate. In Group 1 we place the mildest cases, *i. e.*, those with the lowest grade of toxicity, and in Group 4 the severest cases, *i. e.*, those with the highest grade of toxicity. Groups 2 and 3 are intermediate. We find that there is a certain conformity between the groups graded by the clinical picture and graded by the metabolic rate. Table I shows the percentage of cases in each group when classified by the two methods.

TABLE I.

	Per cent. of cases based on basal metabolism.	Per cent. of cases based on clinical pictures.
Group 1	26.4	30.9
Group 2	21.4	19.0
Group 3	30.9	33.3
Group 4	21.4	16.6

The largest percentage of cases fall in Group 3. The conformity between the several groups, as classified on the one hand by the clinical phenomena and on the other by the metabolic rate, is sufficient to enable us to say that in the majority of cases we have in the basal metabolic rate a numerical index of the patient's toxicity. The advantages of having a numerical index is self-evident; it gives us at once a means of classifying our patients, a guide to treatment and a measure of the improvement under any particular treatment. We do not as yet have sufficient confidence in the metabolic rate to allow it precedence over the clinical picture; we regard it merely as one link in the chain of evidence and still rely upon our own judgment as to operative risk and surgical toleration in the interpretation of the symptom-complex, attaching greater significance to loss of weight, emotional instability and pulse-rate.

The metabolic rate is of special value in diagnosis in that it offers a ready means of distinguishing cases of true hyperthyroidism from those cases of neurasthenia, cardiovascular disease or tuberculosis, who present the clinical picture of toxicity and who happen to have a simple adenomatous enlargement of the thyroid. These cases are often sent to the surgeon as a court of last resort. Such cases would naturally not be benefited by any operation and might be made a good deal worse.

The metabolic rate enables us to decide for or against operation in cases in which there is little or no perceptible enlargement of the thyroid gland and in which the only evidence of toxicity is tachycardia. We have had only one instance in which we disregarded a normal metabolic rate and relied upon our interpretation of the clinical picture and operated. On leaving the hospital this case showed clinical improvement, but sufficient time has not elapsed for us to judge of the ultimate result.

In distinguishing between cases of true Graves's disease, *i. e.*, the hyperplastic toxic goiter, and cases of toxic adenoma the observations of the metabolic rates bear out our opinion based on clinical observation, namely, that for practical purposes the two should be treated alike. We find that the metabolic rate may be as high in one as in the other and the operative risks just as great. The distinction is purely a pathologic one, and for the present, at least, we see no reason for laying much stress on it.

In treatment we find that we may be guided by the metabolic rate in the choice of operations. Thus in Groups 1 and 2 we may proceed with a subtotal thyroidectomy at once. In Group 3, in the majority of instances, we first do a bipolar ligation; only occasionally a thyroidectomy as the initial procedure. In Group 4 we never do a thyroidectomy first but choose either unipolar or bipolar ligation.

The metabolic rate is also useful in determining the amount of improvement which any course of treatment may have effected. Table 2 shows the numerical reduction of the metabolic rates after ligation and after thyroidectomy.

TABLE II.—REDUCTION OF THE METABOLIC RATE.

	After ligation. Points.	After thyroidectomy. Points.
Maximum	61.9	60.0
Minimum	2.2	8.0
Average	31.7	28.3

It is interesting to note that after ligation the average reduction was greater than after thyroidectomy. That the two figures cannot be compared, and any deductions drawn as to the relative value of these two procedures is evident when we consider the type of case which is selected for ligation. Those cases which have a preliminary ligation have the highest metabolic rates. In reducing the metabolic rate it is as though we were reducing the height of a pyramid; much less effort is expended in taking away the top half, the labor increasing with each successive step. It is easier, therefore, to cut down the top half of a high metabolic rate by ligation than to remove the remainder, this more difficult part of the work being accomplished by the thyroidectomy. The reduction in total points, therefore, is less after thyroidectomy than after ligation.

Summary. Estimations of basal metabolism are of value in the following ways:

1. Positive. In eliminating those cases which will not be benefited, and might be made worse by operation.

2. Supplemental. (*a*) In offering confirmatory evidence of the degree of toxicity.

(*b*) In offering a quantitative rather than a qualitative index for use in diagnosis, prognosis and treatment.

3. Problematical. It may be possible to determine by the metabolic rate how much thyroid tissue may be removed. The reduction of the metabolic rate to points well below that of the normal range (–10) should imply that too much secreting substance had been removed. Such cases must be studied clinically for signs of hypothyroidism. We have had two patients whose metabolic rate after operation fell well below normal—in one to –17 per cent., the second to –30 per cent. Neither of these cases has shown signs of hypothyroidism.